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## Forskning

Ljud innehåller energi som kan generera krafter på mikroskopiska föremål som blodkroppar och biologiska nanopartiklar. Min grupp studerar fysiken hos ultraljudsvägor som interagerar med vätskor och mikroskopiska objekt. I samarbete med biologer och biomedicinska forskare bygger vi instrument för att separera celler och nanopartiklar med ultraljud.

## Anställning

**Universitetslektor**

Avdelningen för Biomedicinsk teknik

Lunds universitet

Lund, Sverige

2015 sep. 21 → present

**Universitetslektor**

Acoustofluidics group

Lunds universitet

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2017 juni 12 → present

**Principal Investigator**

NanoLund: Centre for Nanoscience

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Lund, Sverige

2022 mars 30 → present

**Profilområdesmedlem**

LTH profilområde: Teknik för hälsa

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2022 juni 28 → present

**Profilområdesmedlem**  
LTH profilområde: Nanovetenskap och halvledarteknologi  
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## Forskningsoutput

**Label-free separation of peripheral blood mononuclear cells from whole blood by gradient acoustic focusing**  
Alsved, J., Rezayati Charan, M., Ohlsson, P., Urbansky, A. & Augustsson, P., 2024 apr. 16, I: *Scientific Reports*. 14, 1, 12 s., 8748.

**Acoustic enrichment of heterogenous circulating tumor cells and clusters from patients with metastatic prostate cancer**  
Magnusson, C., Augustsson, P., Undvall Anand, E., Lenshof, A., Josefsson, A., Welén, K., Bjartell, A., Ceder, Y., Lilja, H. & Laurell, T., 2023 dec. 4, *medRxiv*.

**Acoustophoretic Characterization and Separation of Blood Cells in Acoustic Impedance Gradients**  
Rezayati Charan, M. & Augustsson, P., 2023 aug. 25, I: *Physical Review Applied*. 20, 2, 16 s., 024066.

**Acoustofluidic Three-Dimensional Motion of Suspended Cells at Near-Zero Acoustic Contrast in Homogeneous Media**  
Rezayati Charan, M., Berg, F. & Augustsson, P., 2023, I: *Physical Review Applied*. 19, 1, 014046.

**Acoustophoresis enriches tumor cell clusters in blood of patients with prostate cancer**  
Magnusson, C., Augustsson, P., Undvall Anand, E., Lenshof, A., Josefsson, A., Welén, K., Bjartell, A., Olsson, A. Y., Lilja, H. G. & Laurell, T., 2023.

**Acoustophoresis enrichment of tumor cell clusters in blood of patients with metastatic prostate cancer**  
Magnusson, C., Augustsson, P., Undvall Anand, E., Lenshof, A., Josefsson, A., Bjartell, A., Olsson, A. Y., Lilja, H. G. & Laurell, T., 2023, (Unpublished).

**Freeze Frame Imaging- a new imaging technique for fast dynamics particle tracking**  
Jakobsson, O., Rossi, M., Cierpka, C. & Augustsson, P., 2023, (Unpublished).

**High-power acoustofluidics driven by line double-parabolic-reflectors wave-guided high-power ultrasonic transducer**  
Corato, E., Qiu, W., Morita, T. & Augustsson, P., 2023.

**High-power bulk wave acoustofluidics**  
Corato, E., Jakobsson, O., Qiu, W., Morita, T. & Augustsson, P., 2023.

**Rare cell enrichment by cell self-organization in acoustic fields**  
Soller, R., Jakobsson, O. & Augustsson, P., 2023.

**The acoustophoretic migration and separation of suspended cells in acoustic impedance gradients**  
Rezayati Charan, M. & Augustsson, P., 2023.

**Transient behavior and acoustic streaming effects in acoustically packed blood**  
Soller, R., Jakobsson, O., Qiu, W. & Augustsson, P., 2023.

**Determination of the Complex-Valued Elastic Moduli of Polymers by Electrical-Impedance Spectroscopy for Ultrasound Applications**  
Bodé, W. N., Lickert, F., Augustsson, P. & Bruus, H., 2022 dec., I: Physical Review Applied. 18, 6, 064078.

**Electrical impedance spectroscopy for acoustofluidic applications**  
Bodé, W. N., Lickert, F., Augustsson, P. & Bruus, H., 2022, s. 110-111.

**Thermoacoustic streaming in a linear temperature gradient for perpendicular and parallel ultrasound fields**  
Corato, E., H. Jørgensen, J., Jakobsson, O., Qiu, W., Bruus, H. & Augustsson, P., 2022, s. 190-191.

**Thermoacoustic Streaming Induced by Asymmetric Laser Heating**  
Martens, F., Qiu, W. & Augustsson, P., 2022, s. 128-129.

**Towards high-throughput microfluidic compressibility cytometry using gradient acoustic focusing integrated with density centrifugation**  
Rezayati Charan, M., Andersson, O., Jakobsson, O. & Augustsson, P., 2022.

**Fast Microscale Acoustic Streaming Driven by a Temperature-Gradient-Induced Nondissipative Acoustic Body Force**  
Qiu, W., Joergensen, J., Corato, E., Bruus, H. & Augustsson, P., 2021 aug. 3, I: Physical Review Letters. 127, 6, 6 s., 064501.

**Effects of a Laser-induced Thermal Gradient on the Acoustic Streaming Field**  
Martens, F., Qiu, W., Ehn, A. & Augustsson, P., 2021.

**Self-organization by acoustic contrast factor in acoustically packed beds of whole blood and in-line removal of red blood cells**  
Augustsson, P., Soller, R. & Jakobsson, O., 2021.

**Particle-size-dependent acoustophoretic motion and depletion of micro- and nano-particles at long timescales**  
Qiu, W., Bruus, H. & Augustsson, P., 2020 juli 21, I: Physical Review E. 102, 1, 11 s., 013108.

**Gradient acoustic focusing of sub-micron particles for separation of bacteria from blood lysate**  
Van Assche, D., Reithuber, E., Qiu, W., Laurell, T., Henriques-Normark, B., Mellroth, P., Ohlsson, P. & Augustsson, P., 2020 feb. 28, I: Scientific Reports. 10, 1, 3670.

**Charting cell properties through their acoustophoretic migration in a gradient of density and compressibility**  
Rezayati Charan, M. & Augustsson, P., 2020.

**Thermal-gradient-induced fast convection in acoustofluidic devices**  
Qiu, W., H. Jørgensen, J., Corato, E., Bruus, H. & Augustsson, P., 2020.

**Experimental Characterization of Acoustic Streaming in Gradients of Density and Compressibility**

Qiu, W., Karlsen, J. T., Bruus, H. & Augustsson, P., 2019 feb. 7, I: *Physical Review Applied*. 11, 2, 11 s., 024018.

**Acoustic patterning of concentration fields and its real-time imaging**

Qiu, W., Beech, J., Tegenfeldt, J., Bruus, H. & Augustsson, P., 2019, (Unpublished).

**Plasma generation and label-free mononuclear cell separation from whole blood by one-step acoustic focusing**

Alsved, J., Urbansky, A., Ohlsson, P., Petersson, K., Nielsen, E., Michanek, A. & Augustsson, P., 2019, *23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2019*. Chemical and Biological Microsystems Society, s. 140-141 2 s. (23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2019).

**Acoustic impedance matched buffers enable separation of bacteria from blood cells at high cell concentrations**

Ohlsson, P., Petersson, K., Augustsson, P. & Laurell, T., 2018 dec. 1, I: *Scientific Reports*. 8, 1, 9156.

**Acoustic Streaming and Its Suppression in Inhomogeneous Fluids**

Karlsen, J. T., Qiu, W., Augustsson, P. & Bruus, H., 2018 jan. 30, I: *Physical Review Letters*. 120, 5, 6 s., 054501.

**Acoustofluidic hematocrit determination**

Petersson, K., Jakobsson, O., Ohlsson, P., Augustsson, P., Scheding, S., Malm, J. & Laurell, T., 2018, I: *Analytica Chimica Acta*. 1000, s. 199-204

**ACouWash: A standalone instrument for the washing, separation and enrichment of cells.**

Mallinson, J., Linander, O., Magnusson, C., Pircs, K. & Augustsson, P., 2018, *22nd International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2018*. Chemical and Biological Microsystems Society, s. 279-281 3 s. (22nd International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2018; vol. 1).

**Suppression of acoustic streaming by the inhomogeneity-induced acoustic body force**

Qiu, W., Karlsen, J., Bruus, H. & Augustsson, P., 2018, I: *Proceedings of Meetings on Acoustics*. 34, 1, 045023.

**Clinical-Scale Cell-Surface-Marker Independent Acoustic Microfluidic Enrichment of Tumor Cells from Blood**

Magnusson, C., Augustsson, P., Lenshof, A., Ceder, Y., Laurell, T. & Lilja, H., 2017 nov. 21, I: *Analytical Chemistry*. 89, 22 , s. 11954-11961 8 s.

**Shaping acoustofluidic landscapes to profile and separate cells and sub-micron particles**

Augustsson, P., 2017 okt. 31, *2017 IEEE International Ultrasonics Symposium, IUS 2017*. IEEE Computer Society, 8091549

**Acoustic Force Density Acting on Inhomogeneous Fluids in Acoustic Fields**

Karlsen, J. T., Augustsson, P. & Bruus, H., 2016 sep. 9, I: *Physical Review Letters*. 117, 11, s. 114504 6 s.

**Iso-acoustic focusing of cells for size-insensitive acousto-mechanical phenotyping**

Augustsson, P., Karlsen, J. T., Su, H-W., Bruus, H. & Voldman, J., 2016 maj 16, I: *Nature Communications*. 7, 11556.

**Acoustophoretic manipulation of sub-micron objects enabled by density gradients**

Augustsson, P., Karlsen, J. T. & Bruus, H., 2016, *20th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2016*. Chemical and Biological Microsystems Society, s. 158-159 2 s.

**Label-free concentration of viable neurons, hESCs and cancer cells by means of acoustophoresis.**

Castro Zalis, M., Reyes, J. F., Augustsson, P., Holmqvist, S., Roybon, L., Laurell, T. & Deierborg, T., 2016, I: *Integrative Biology*. 8, 3, s. 332-340 9 s.

**Theory of the acoustic force density acting on inhomogeneous fluids**

Karlsen, J. T., Augustsson, P. & Bruus, H., 2016, *20th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2016*. Chemical and Biological Microsystems Society, s. 721-722 2 s.

**Twenty second acoustofluidic whole blood hematocrit assay**

Petersson, K., Jakobsson, O., Ohlsson, P., Augustsson, P. & Laurell, T., 2016, *20th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2016*. Chemical and Biological Microsystems Society, s. 635-636 2 s.

**Acoustofluidic, label-free separation and simultaneous concentration of rare tumor cells from white blood cells**

Antfolk, M., Magnusson, C., Augustsson, P., Lilja, H. & Laurell, T., 2015, I: *Analytical Chemistry*. 87, 18, s. 9322-9328

**Applications in continuous flow acoustophoresis**

Lenshof, A., Augustsson, P. & Laurell, T., 2015, *Microscale Acoustophoresis*. Laurell, T. & Lenshof, A. (red.). Royal Society of Chemistry, s. 148-188

**A single inlet two-stage acoustophoresis chip enabling tumor cell enrichment from white blood cells**

Antfolk, M., Antfolk, C., Lilja, H., Laurell, T. & Augustsson, P., 2015, I: *Lab on a Chip*. 15, 9, s. 2102-2109

**Iso-acoustic focusing for size-insensitive cell separation based on acoustic properties**

Augustsson, P. & Voldman, J., 2015, *MicroTAS 2015 - 19th International Conference on Miniaturized Systems for Chemistry and Life Sciences*. Chemical and Biological Microsystems Society, s. 14-16 3 s.

**Acoustic radiation forces at liquid interfaces impact the performance of acoustophoresis.**

Deshmukh, S., Brzozka, Z., Laurell, T. & Augustsson, P., 2014, I: *Lab on a Chip*. 14, 17, s. 3394-3400

**Acoustophoresis for label-free separation and concentration of cancer cells**

Antfolk, M., Augustsson, P., Magnusson, C., Lilja, H. & Laurell, T., 2014, *18th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2014*. Chemical and Biological Microsystems Society, s. 2508-2509 (18th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2014).

**Focusing of sub-micrometer particles and bacteria enabled by two-dimensional acoustophoresis.**

Antfolk, M., Muller, P. B., Augustsson, P., Bruus, H. & Laurell, T., 2014, I: *Lab on a Chip*. 14, 15, s. 2791-2799

**Improved acoustophoretic circulating tumor cell (CTC) separation for low target cell numbers in clinical volumes**

Lenshof, A., Magnusson, C., Augustsson, P., Haflidadottir, B., Lilja, H. & Laurell, T., 2014, *18th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2014*. Chemical and Biological Microsystems Society, s. 594-596 (18th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2014).

**Acoustophoresis separation of bacteria from blood cells for rapid sepsis diagnostics**

Ohlsson, P. D., Petersson, K., Augustsson, P. & Laurell, T., 2013, *17th International Conference on Miniaturized Systems for Chemistry and Life Sciences, MicroTAS 2013*. Chemical and Biological Microsystems Society, Vol. 2. s. 1320-1322 3 s.

**Microchannel Acoustophoresis does not Impact Survival or Function of Microglia, Leukocytes or Tumor Cells.**

Burguillos Garcia, M., Magnusson, C., Nordin, M., Lenshof, A., Augustsson, P., Hansson, M., Elmer, E., Lilja, H., Brundin, P., Laurell, T. & Deierborg, T., 2013, I: *PLoS ONE*. 8, 5, e64233.

**Ultrasound-induced acoustophoretic motion of microparticles in three dimensions**

Muller, P. B., Rossi, M., Marin, A. G., Barnkob, R., Augustsson, P., Laurell, T., Kaehler, C. J. & Bruus, H., 2013, I: *Physical Review E (Statistical, Nonlinear, and Soft Matter Physics)*. 88, 2, 023006.

**Acoustic radiation- and streaming-induced microparticle velocities determined by microparticle image velocimetry in an ultrasound symmetry plane**

Barnkob, R., Augustsson, P., Laurell, T. & Bruus, H., 2012, I: *Physical Review E (Statistical, Nonlinear, and Soft Matter Physics)*. 86, 5, 056307.

**Acoustofluidics 11: Affinity specific extraction and sample decomplexing using continuous flow acoustophoresis.**  
Augustsson, P. & Laurell, T., 2012, I: Lab on a Chip. 12, 10, s. 1742-1752

**Acoustophoretic microfluidic chip for sequential elution of surface bound molecules from beads or cells**  
Augustsson, P., Malm, J. & Ekström, S., 2012, I: Biomicrofluidics. 6, 3, 034115.

**Label-free somatic cell cytometry in raw milk using acoustophoresis.**  
Grenvall, C., Folkenberg, J. R., Augustsson, P. & Laurell, T., 2012, I: Cytometry Part A. 81A, 12, s. 1076-1083

**Microfluidic, Label-Free Enrichment of Prostate Cancer Cells in Blood Based on Acoustophoresis**  
Augustsson, P., Magnusson, C., Nordin, M., Lilja, H. & Laurell, T., 2012, I: Analytical Chemistry. 84, 18, s. 7954-7962

**Automated and temperature-controlled micro-PIV measurements enabling long-term-stable microchannel acoustophoresis characterization.**  
Augustsson, P., Barnkob, R., Wereley, S. T., Bruus, H. & Laurell, T., 2011, I: Lab on a Chip. 11, 24, s. 4152-4164

**Measuring density and compressibility of white blood cells and prostate cancer cells by microchannel acoustophoresis**  
Barnkob, R., Augustsson, P., Magnusson, C., Lilja, H., Laurell, T. & Bruus, H., 2011, *15th International Conference on Miniaturized Systems for Chemistry and Life Sciences 2011, MicroTAS 2011*. s. 127-129 (15th International Conference on Miniaturized Systems for Chemistry and Life Sciences 2011, MicroTAS 2011; vol. 1).

**On microchannel acoustophoresis - Experimental considerations and life science applications**  
Augustsson, P., 2011, 72 s.

**Cell separation based on acoustophoresis and applications in health care**  
Lenshof, A., Petersson, F., Augustsson, P., Grenvall, C., Ekström, S., Persson, J., Swärd, A-M., Åberg, L., Ohlin, M. & Laurell, T., 2010.

**Extraction of circulating tumor cells from blood using acoustophoresis**  
Augustsson, P., Magnusson, C., Grenvall, C., Lilja, H. & Laurell, T., 2010, *14th International Conference on Miniaturized Systems for Chemistry and Life Sciences 2010, MicroTAS 2010*. s. 1592-1594 (14th International Conference on Miniaturized Systems for Chemistry and Life Sciences 2010, MicroTAS 2010; vol. 3).

**Measuring the local pressure amplitude in microchannel acoustophoresis**  
Barnkob, R., Augustsson, P., Laurell, T. & Bruus, H., 2010, I: Lab on a Chip. 10, 5, s. 563-570

**Buffer medium exchange in continuous cell and particle streams using ultrasonic standing wave focusing**  
Augustsson, P., Åberg, L. B., Sward-Nilsson, A-M. K. & Laurell, T., 2009, I: Microchimica Acta. 164, 3-4, s. 269-277

**Decomplexing biofluids using microchip based acoustophoresis**  
Augustsson, P., Persson, J., Ekström, S., Ohlin, M. & Laurell, T., 2009, I: Lab on a Chip. 9, 6, s. 810-818

**Harmonic microchip acoustophoresis: a route to online raw milk sample precondition in protein and lipid content quality control**  
Grenvall, C., Augustsson, P., Folkenberg, J. R. & Laurell, T., 2009, I: Analytical Chemistry. 81, 15, s. 6195-6200

**Acoustic microfluidic chip technology to facilitate automation of phage display selection**  
Persson, J., Augustsson, P., Laurell, T. & Ohlin, M., 2008, I: The FEBS Journal. 275, 22, s. 5657-5666

**Decomplexing biofluids using microchip based acoustophoresis**  
Augustsson, P., Persson, J., Ekström, S., Ohlin, M. & Laurell, T., 2008.

**On chip affinity selection of antibodies using ultrasonic standing waves**  
Augustsson, P., Persson, J., Ohlin, M. & Laurell, T., 2008.

**Fluorescent Activated Cell Sorter using Ultrasound Standing Waves in Micro Channels**  
Grenvall, C., Carlsson, M., Augustsson, P., Petersson, F. & Laurell, T., 2007, *Micro Total Analysis Systems 2007. Proceedings of μTAS 2007. 11th International Conference on Miniaturized Systems for Chemistry and Life Sciences*. Viovy, J-L., Tabeling, P., Descroix, S. & Malaquin, L. (red.). Chemical and Biological Microsystems Society, Vol. 2. s. 1813-1815 3 s.

**On-chip affinity selection of antibodies using ultrasonic standing waves.**  
Augustsson, P., Persson, J., Ohlin, M. & Laurell, T., 2007, *Micro Total Analysis Systems 2007. Proceedings of μTAS 2007. 11th International Conference on Miniaturized Systems for Chemistry and Life Sciences*. Viovy, J-L., Tabeling, P., Descroix, S. & Malaquin, L. (red.). Chemical and Biological Microsystems Society, Vol. 2. s. 1810-1812

**Ultrahydrophobic properties of porous silicon for surface based bioanalysis**  
Ressine, A., Augustsson, P., Marko-Varga, G. & Laurell, T., 2007, *Micro Total Analysis Systems 2007. Proceedings of μTAS 2007 Conference*. Jean-Louis, V., Tabeling, P., Descroix, S. & Malaquin, L. (red.). Chemical and Biological Microsystems Society, Vol. 2. s. 1046-1047 3 s.

**Improved Carrier Medium Exchange Efficiency in Acoustic Standing Wave Particle Washing**  
Augustsson, P., Petersson, F. & Laurell, T., 2006, *Micro Total Analysis Systems 2006. Proceedings of μTAS 2006 Conference*. Kitamori, T., Fujita, H. & Hasebe, S. (red.). Society for Chemistry and Micro-Nano Systems, Vol. 1. s. 627-629 3 s.

**Separation of escherichia coli bacteria from raw milk using resonant ultrasound in a microfluidic channel**  
Augustsson, P., Matsuoka, H. & Laurell, T., 2006.

## Priser och utmärkelser

**Ingvar Carlsson Award 2017**  
Augustsson, Per (Mottagare), 2017 apr. 10

**PhD-thesis of the year 2011 at the Faculty of Engineering at Lund University**  
Augustsson, Per (Mottagare), 2012 maj 23

**The Phabian Award 20013**  
Augustsson, Per (Mottagare), 2014 feb. 11

## Forskningsmedel

**Acoustic separation of blood components**  
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2023/01/01 → 2024/03/01